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Förster-type Nonradiative Energy Transfer for Assemblies of Arrayed Nanostructures: Confinement Dimension vs. Stacking Dimension HILMI VOLKAN DEMIR[1], PEDRO LUDWIG HERNANDEZ MARTINEZ, Nanyang Tech Univ, ALEXANDER O. GOVOROV, Ohio University — We report a theoretical framework of generalized theory for the Förster-type NRET with mixed dimensionality in arrays. These include combinations of arrayed nanostructures made of nanoparticles (NPs) and nanowires (NWs) assemblies in one-dimension (1D), two-dimension (2D), and three-dimensions (3D) completing the framework for the transfer rates in all possible combinations of different confinement geometries and assembly architectures, we obtain a unified picture of NRET in assembled nanostructures arrays. We find that the generic NRET distance dependence is modified by arraying the nanostructures. For an acceptor NP the rate distance dependence changes from $\gamma \propto d^{-6}$ to $\gamma \propto d^{-5}$ when they are arranged in a 1D stack, and to $\gamma \propto d^{-4}$ when in a 2D array, and to $\gamma \propto d^{-3}$ when in a 3D array. Likewise, an acceptor NW changes its distance dependence from $\gamma \propto d^{-5}$ to $\gamma \propto d^{-4}$ when they are arranged in a 1D array and to $\gamma \propto d^{-3}$ when in a 2D array. These finding shows that the numbers of dimensions across which nanostructures are stacked is equally critical as the confinement dimension of the nanostructure in determining the NRET kinetics.

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